

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 19 JUL 2005

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| Applicant TELEZYGOLGY INC et al | | | |

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
 - a. ☒ (sent to the applicant and to the International Bureau) a total of 14 sheets, as follows:
 - ☒ 14 sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or table related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items:

| | |
|---|---|
| <input checked="" type="checkbox"/> Box No. I | Basis of the report |
| <input type="checkbox"/> Box No. II | Priority |
| <input checked="" type="checkbox"/> Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input checked="" type="checkbox"/> Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> Box No. VI | Certain documents cited |
| <input type="checkbox"/> Box No. VII | Certain defects in the international application |
| <input type="checkbox"/> Box No. VIII | Certain observations on the international application |

| | |
|---|---|
| Date of submission of the demand 21 October 2004 | Date of completion of the report 11 July 2005 |
| Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929 | Authorized Officer R. SUBBARAYAN Telephone No. (02) 6283 2377 |

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/AU2004/000371

No. I Basis of the report

With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on translations from the original language into the following language which is the language of a translation furnished for the purposes of:

☐ international search (under Rules 12.3 and 23.1 (b))

☐ publication of the international application (under Rule 12.4)

☐ international preliminary examination (under Rules 55.2 and/or 55.3)

With regard to the **elements** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

☐ the international application as originally filed/furnished

☒ the description:

pages 1,3-6,8,10,13-15 as originally filed/furnished

pages* 2,7-7a,9,11-12 received by this Authority on 6 June 2005 with the letter of 6 June 2005

pages* received by this Authority on with the letter of

☒ the claims:

pages as originally filed/furnished

pages* as amended (together with any statement) under Article 19

pages* 16-23 received by this Authority on 6 June 2005 with the letter of 6 June 2005

pages* received by this Authority on with the letter of

☒ the drawings:

pages 1/12-12/12 as originally filed/furnished

pages* received by this Authority on with the letter of

pages* received by this Authority on with the letter of

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages

☐ the claims, Nos.

☐ the drawings, sheets/figs

☐ the sequence listing (*specify*):

☐ any table(s) related to the sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages

☐ the claims, Nos.

☐ the drawings, sheets/figs

☐ the sequence listing (*specify*):

☐ any table(s) related to the sequence listing (*specify*):

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

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Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application

☒ claims Nos: 32-40

because:

☐ the said international application, or the said claims Nos.

relate to the following subject matter which does not require an international preliminary examination (*specify*):

☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos.
are so unclear that no meaningful opinion could be formed (*specify*):

☐ the claims, or said claims Nos.
are so inadequately supported by the description that no meaningful opinion could be formed.

☒ no international search report has been established for said claim Nos. 32-40

Independent claim 32 includes the new feature that the assembly includes a brace for the connecting means positioned between the first and second ends of the connecting means. This new feature was not present in any of the claims of the international application which were the subject of the international search. It is therefore considered that the International Search Report is not comprehensive enough to comment on the novelty and inventive step of this claim without additional searching.

☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:

the written form ☐ has not been furnished

☐ does not comply with the standard

the computer readable form ☐ has not been furnished

☐ does not comply with the standard

☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-bis of the Administrative Instructions.

☐ See Supplemental Box for further details.

Box No. IV Lack of unity of invention

- ☐ In response to the invitation to restrict or pay additional fees the applicant has:
- ☐ restricted the claims.
 - ☐ paid additional fees.
 - ☐ paid additional fees under protest.
 - ☐ neither restricted nor paid additional fees.
- ☒ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is:
- ☐ complied with.
- ☒ not complied with for the following reasons:
1. Claims 1-31 & 41-78 are directed to a fastener including a locking pin movable between locked and release positions, and an actuator of shape memory alloy which is adapted when elongated to cause the pin to move to the release position. It is considered that the actuator of shape memory alloy which is adapted when elongated to cause the pin to move to the release position comprises a first "special technical feature".
 2. Claims 32-40 are directed to a fastener assembly including a bar adapted to engage in a groove in a pin and a connecting means of shape memory alloy which is adapted to change shape and draw the bar out of engagement with the groove. It is considered that the connecting means of shape memory alloy which is adapted to change shape and draw the bar out of engagement with the groove comprises a second special technical feature.
- Since the abovementioned groups of claims do not share any of the technical features identified, a "technical relationship" between the inventions, as defined in PCT rule 13.2 does not exist. Accordingly the international application does not relate to one invention or to a single inventive concept, a priori.
4. Consequently, this report has been established in respect of the following parts of the international application:
- ☐ all parts.
- ☒ the parts relating to claims Nos. 1-31 & 41-78

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/AU2004/000371

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Statement

| | | |
|-------------------------------|--|-----|
| Novelty (N) | Claims 2-10,12,14-19,22-31,42-51,53,55-61,64-73, 75-78 | YES |
| | Claims 1,11,13,20,21,41,52,54,62,63,74 | NO |
| Inventive step (IS) | Claims 6-10,12,45,47-51,53,75-78 | YES |
| | Claims 1-5,11,13-31,41-44,46,52,54-74 | NO |
| Industrial applicability (IA) | Claims 1-31 & 41-78 | YES |
| | Claims | NO |

Citations and explanations (Rule 70.7)

D1) US 6508437

D2) US 6126115

D3) GB 2166185

D4) US 6276711

NOVELTY

Claims 1,11,13,20,21,41,52,54,62,63,74:

Citation D1 disclose all of the features of these claims. For example D1 discloses a fastener for releasably securing a first element (16) to a second element (12), including a locking pin (26) movable between a locked position and a release position, the pin having an engageable head, means for engaging the head with the second element, bias means (14) for urging the second element away from the first element and an actuator (20) comprising shape memory alloy adapted to elongate upon application of appropriate energy to cause the pin to move to the release position. In column 2 it states that the isolator (14) pushes the payload vertically upward to the neutral position and that it contains a spring and damper and the isolator therefore constitutes the bias means for urging the second element away from the first element.

It is noted that the scope of claim 41 is not limited to securing an airbag between a base and a cover, and is therefore anticipated by citation D1 even though this citation is not directed to such an application.

INVENTIVE STEP

Claims 1,11,13,20,21,41,52,54,62,63,74: As above

Claims 2-5,14-19,22-31,42-44,46,55-61,64-73:

The features added by these claims are considered common general knowledge in the art and therefore these claims are not inventive.

While there is a need for preventing unauthorised access to air bags, there is a continuing requirement to utilise fasteners which permit rapid assembly of the air bag to the vehicle during vehicle construction.

DISCLOSURE OF THE INVENTION

- 5 It is an object of the present invention to provide an air bag fastener which overcomes or at least alleviates some or all of the described problems. In particular, it is an aim of the invention, at least in some embodiments, to prevent unauthorised access to air bags, while facilitating rapid assembly.

Accordingly, in a first aspect, this invention provides a fastener for releaseably securing
10 a first element to a second element in a spaced-apart relationship, the fastener including:

- (a) a locking pin movable between a locked position in which the first element is secured in spaced relationship to the second element and a release position in which the first element is released from the spaced relationship with the second element, the locking pin having an engageable head;
- 15 (b) means for engaging the head of the locking pin with the second element;
- (c) bias means urging the second element away from the first element; and
- (d) an actuator comprising or including shape memory alloy adapted to elongate upon application of appropriate energy;

wherein the actuator is adapted, when elongated, to cause the locking pin to move to the
20 release position.

It is preferred that the fastener includes an integrated processor, switch and one or more sensors. The sensors can carry out the function of sensing whether the locking pin is in the locked or release position.

The fastener of the invention is particularly suitable for retaining an air bag or other
25 automotive component behind a fascia or other cover. In this situation, the first element

situations. The air bag assembly does not have any fasteners which can be accessed by traditional means, reducing or eliminating the opportunity for theft of the air bag.

If an air bag is faulty or has been deployed after impact, the vehicle is taken to an authorised repair shop. Here a technician plugs a laptop into the ECU and downloads
5 the appropriate information, including the status of the fasteners and the status of the air bag (present or absent). Optionally, the dialogue between the fasteners and the laptop recognises the authority of the laptop to operate the fasteners. Within a software interface on the laptop, the technician can instruct the fasteners to release. The ECU sends an electronic message to a controller chip mounted in the air bag or integrated
10 into one of the fasteners. The controller chip, in turn, supplies the appropriate current from the vehicle's battery to the fastener or fasteners. The current supplies heat to the actuator which elongates and pushes the lock pin out of engagement with the second element. Access is then provided to the air bag.

It is also within the scope of this invention to provide a manual override if the actuator
15 fails or if an energy source cannot be provided. The air bag assembly may carry on the first or second element an indicator, such as a moulded depression, into which a special tool may be pressed. The tool can pierce the air bag and push the lock pin to the unlocked position. This renders the air bag unusable so it can operate as a tamper evident mechanism.

20 In a second aspect, this invention provides a fastener assembly for releasably securing an element, the element including a post or pin having a groove, the assembly including a bar adapted to engage the groove to secure the element, the assembly also including a connecting means having first and second ends, the first end being attached to an end of the bar and the second end being attached to an anchor point, the connecting means
25 consisting of or including shape memory material which, upon application of suitable energy, is adapted to change shape and draw the bar out of engagement with the groove, thus releasing the element, wherein the assembly also includes a brace for the

connecting means positioned between the first and second ends of the connecting means.

Preferably, the element has more than one post or pin, each having a groove. The bar may engage the groove in more than one post or pin. In one embodiment, the bar
5 engages the groove in each of two posts or pins. In the case of a fastener assembly for

connecting means is attached to each end of the bar and, upon shrinking, draws the bar out of engagement with the groove.

The bar may need to be biased into engagement with the groove in the secured position.

The fastening system of this second aspect of the invention may be particularly suitable for fastening interior panels in automobiles. One example is the fastening of the interior lining of a door panel to the car door.

The invention in its various aspects will now be described in connection with certain non-limiting embodiments shown in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

10 In the drawings:

Figure 1 is a sectional, perspective view of a first embodiment of a fastener according to the first aspect of the invention, showing the locking pin in the locked position;

Figure 2 is a similar view of the fastener of Figure 1, showing the locking pin in the release position;

15 Figure 3 is a perspective view of an air bag module during assembly to a steering wheel, using the fastener of the invention;

Figure 4 is a cross sectional view of a second embodiment of the fastener of the invention;

20 Figure 5 is a cross sectional view of a further embodiment of the fastener of the first aspect of the invention, similar to that in Figure 4, but showing the fastener in situ between an air bag molding and a steering wheel casting;

Figure 6 is an exploded view of the assembly of Figure 5;

Figure 7 shows in larger scale and in reverse configuration the portion of Figure 6 marked 7-7;

in spaced relationship with air bag bracket 12. As can be seen from Figure 2, when locking pin 16 is in the release position, air bag bracket 12 is no longer held in spaced relationship with bracket 14.

Locking pin 16 includes head 18 being of larger dimension than shaft 20 of locking pin
5 16. In the locked position, head 18 engages clip 22. The engagement between head 18 and clip 22, together with guide pin 24, hold locking pin 16 in the configuration shown in Figure 1.

Locking pin 16 is biased towards guide pin 24 by spring 26. A second spring 28 acts as an ejector when head 18 is released from clip 22. Spring 28 sits within outer sleeve 30.

10 Spring 32, of shape memory alloy, is the actuator for releasing fastener 10. Actuator spring 32 communicates via ECU cable attachment point 34 with the vehicle's power source (the battery). When energy supplied by the battery (not shown) causes actuator spring 32 to heat above its crystalline transition temperature, spring 32 expands to the configuration shown in Figure 2, bearing on plate 36 and pushing locking pin 16
15 upwardly against the bias of spring 26. Once head 18 has been pushed above clip 22, clip 22, being made of resilient material, can deflect inwardly and both clip 22 and head 28 are free to be ejected below bracket 14, under the influence of ejector spring 28, to assume the release configuration shown in Figure 2.

The size of cavity 38 in bracket 14 is chosen to prevent release of fastener 10 when head
20 18 engages clip 22 and to permit both head 18 and clip 22 to pass through when there is no such engagement.

Fastener 10 is shown in situ in Figure 3, attached to air bag bracket 12 on vehicle steering wheel 40. An air bag (not shown) is mounted behind cover 42. The interface between cable attachment port 34 and the vehicle ECU is effected through electronics
25 link 44.

In the configuration shown in Figure 3, fastener 10 is an intelligent fastener which is linked to three slave fasteners to be inserted in apertures 46, 48 and 50. When fastener 10 is actuated, it communicates with the slave fasteners so that they are also released.

Preferably, there is also mounted on air bag bracket 12 one or more sensors to sense whether the air bag is present or absent. The choice of suitable sensor will be apparent to one skilled in the art. The sensor or sensors may be part of cover 42 instead of on air bag bracket 12, as desired.

The embodiment illustrated in Figures 1 and 2 is monostable in that there is a single actuating spring 32 and, when heated, this spring expands or elongates to release the fastener.

The second embodiment illustrated in Figure 4 is a bistable version of the fastener of the invention. In this Figure, fastener 60 once again holds air bag bracket 12 in spaced relationship with steering wheel bracket 14. Locking pin 56 includes head 58 designed to engage with clip 62. In this embodiment, however, there is no guide pin. Instead locking pin 56, has, besides head 58, upper shaft 52 and lower shaft 54. Cavity 64 journaled into and through each of lower shaft 54 and upper shaft 52 and part way into head 58 allows for manual release of fastener 60. Insertion of a thin tool of sufficient length through aperture 66 along the length of cavity 64 and pressure on head 58 can cause head 58 to be popped clear of clip 62, allowing clip 62 to fold in as in the embodiment in Figures 1 and 2.

Like the embodiment in Figures 1 and 2, fastener 60 includes ejector spring 68 within sleeve 70. However, there is no bias spring 26 in fastener 60. Instead, fastener 60 has two shape memory springs 72 and 74. Actuator spring 72 carries out the same role as actuator spring 32 in the case of fastener 10. Actuator spring 74, once actuated through heat when fastener 60 is in the release position, expands to push head 58 into engagement with clip 62 and to secure steering wheel bracket 14 in spaced relationship with air bag bracket 12.

Claims

1. A fastener for releasably securing a first element to a second element in a spaced-apart relationship, the fastener including:
 - (a) a locking pin moveable between a locked position in which the first element
5 is secured in spaced relationship to the second element and a release position in which the first element is released from the spaced relationship with the second element, the locking pin having an engageable head;
 - (b) means for engaging the head of the locking pin with the second element;
 - (c) bias means urging the second element away from the first element; and
 - 10 (d) an actuator comprising or including shape memory alloy adapted to elongate upon application of appropriate energy;

wherein the actuator is adapted, when elongated, to cause the locking pin to move to the release position.

2. The fastener of claim 1, which also includes an integrated processor, a switch
15 and one or more sensors.
3. The fastener of claim 2, in which the sensor is adapted to sense whether the locking pin is in the locked position or the release position.
4. The fastener of claim 3, in which the sensor includes micro switches adapted to be activated by the locking pin or an extension of the locking pin.
- 20 5. The fastener of any one of any one of claims 1 to 4, wherein the locking pin is made of polymeric material.
6. The fastener of any one of claims 1 to 5, wherein the locking pin has an internal cavity adapted to receive a guide pin.

7. The fastener of any one of claims 1 to 6, wherein the means for engaging the head of the locking pin with the second element comprises or includes a clip.
8. The fastener of claim 7, wherein the clip is annular.
9. The fastener of claim 7 or 8, wherein the clip is in two or more parts.
- 5 10. The fastener of any one of claims 7 to 9, wherein the clip is made of elastic material.
11. The fastener of any one of claims 1 to 10, wherein the locking pin has a shaft of narrower cross-section than the head of the locking pin.
12. The fastener of claim 11, wherein the locking pin is adapted to move to the
10 release position after the engagement means has disengaged the head of the locking pin and has moved towards the shaft.
13. The fastener of any one of claims 1 to 12 when assembled onto the first element.
14. The fastener of any one of claims 1 to 13, wherein the bias means urging the second element away from the first element is a coiled spring.
- 15 15. The fastener of any one of claims 1 to 14, wherein the actuator is a single coiled spring made of shape memory alloy.
16. The fastener of claim 15, wherein the actuator is adapted to elongate by energy provided from an energy source.
17. The fastener of claim 16, wherein there is a cable connection between the energy
20 source and the actuator.
18. The fastener of claim 16, wherein the energy is in the form of infra red light or ultrasound.
19. The fastener of any one of claims 1 to 18, wherein the locking pin is adapted to default to the locked position.

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20. The fastener as claimed in any one of claims 1 to 19, which includes a second actuator.
21. The fastener of claim 20, wherein the second actuator comprises or includes shape memory alloy adapted to elongate upon application of appropriate energy to cause the locking pin to move to the locked position.
22. The fastener of any one of claims 1 to 21, which includes a detent adapted to hold the locking pin in the locked and/or release position.
23. The fastener of claim 22, wherein the detent is adapted to clip into a groove in the locking pin when the locking pin is in the release position, the engagement between the detent and the groove being adapted to prevent the locking pin moving towards the locked position without positive actuation.
24. The fastener of any one of claims 1 to 19, wherein the locking pin is adapted to move from the locked position to the release position irreversibly.
25. The fastener of any one of claims 1 to 19, wherein the actuator is adapted to cause the locking pin to move to the locked position when no longer elongated.
26. The fastener of any one of claims 1 to 25, which also includes means to communicate with at least one slave fastener.
27. The fastener of claim 26, wherein the communication means is adapted to communicate with the slave fastener when the locking pin has been caused to move to the release position.
28. The fastener of any one of claims 1 to 27, wherein the fastener has an address.
29. The fastener of claim 28, wherein the address is encrypted.
30. The fastener in any one of claims 1 to 29, wherein the fastener includes means for enabling the fastener to recognise an authorised operator.

31. The fastener of any one of claims 1 to 30, wherein the locked pin is adapted to be moved to the release position manually.
32. A fastener assembly for releasably securing an element, the element including a post or pin having a groove, the assembly including a bar adapted to engage the groove to secure the element, the assembly also including a connecting means having first and second ends, the first end being attached to an end of the bar and the second end being attached to an anchor point, the connecting means consisting of or including shape memory material which, upon application of suitable energy, is adapted to change shape and draw the bar out of engagement with the groove, thus releasing the element, wherein the assembly also includes a brace for the connecting means positioned between the first and second ends of the connecting means.
33. The fastener assembly of claim 32, wherein the element has more than one post or pin, each having a groove.
34. The fastener assembly of claim 33, wherein the bar is adapted to engage the groove in more than one post or pin.
35. The fastener assembly of claim 34, wherein the bar engages the groove in each of two posts or pins.
36. The fastener assembly of any one of claims 32 to 35, wherein the connecting means is a shape memory wire.
37. The fastener assembly of claim 36, wherein the shape memory wire is a titanium-nickel wire.
38. The fastener assembly of claim 36 or 37, wherein the anchor point is the other end of the bar and the connecting means is adapted to change shape by shrinking to draw the bar out of engagement with the groove.

39. The fastener assembly of any one of claims 32 to 38, wherein the bar is biased into engagement with the groove.
40. A fastener assembly substantially as herein described with reference to Figures 12 to 15 or 16 to 18 of the accompanying drawings.
- 5 41. A fastener for releasably securing an airbag between a base and a cover, the fastener including:
- (a) a locking pin moveable between a locked position in which the base is secured in spaced relationship to the cover and a release position in which the base is released from the spaced relationship with the cover, the
 - 10 locking pin having an engageable head;
 - (b) means for engaging the head of the locking pin with the cover;
 - (c) bias means urging the cover away from the base; and
 - (d) an actuator comprising or including shape memory alloy adapted to elongate upon application of appropriate energy,
- 15 wherein the actuator is adapted, when elongated, to cause the locking pin to move to the release position.
42. The fastener of claim 41, which also includes an integrated processor, a switch and one or more sensors.
43. The fastener of claim 42, in which the sensor is adapted to sense whether the
- 20 locking pin is in the locked position or the release position.
44. The fastener of claim 43, in which the sensor includes micro switches adapted to be activated by the locking pin or an extension of the locking pin.
45. The fastener of claim 41 which also includes a sensor adapted to sense and report the presence or absence of the airbag.

46. The fastener of any one of any one of claims 41 to 45, wherein the locking pin is made of polymeric material.
47. The fastener of any one of claims 41 to 46, wherein the locking pin has an internal cavity adapted to receive a guide pin.
- 5 48. The fastener of any one of claims 41 to 47, wherein the means for engaging the head of the locking pin with the cover comprises or includes a clip.
49. The fastener of claim 48, wherein the clip is annular.
50. The fastener of claim 48 or 49, wherein the clip is in two or more parts.
51. The fastener of any one of claims 48 to 50, wherein the clip is made of elastic material.
- 10
52. The fastener of any one of claims 41 to 51, wherein the locking pin has a shaft of narrower cross-section than that of the head of the locking pin.
53. The fastener of claim 52, wherein the locking pin is adapted to move to the release position after the engagement means has disengaged the head of the locking pin and has moved towards the shaft.
- 15
54. The fastener of any one of claims 41 to 53 when assembled onto the base.
55. The fastener of any one of claims 41 to 54, wherein the bias means urging the cover away from the base is a coiled spring.
56. The fastener of any one of claims 41 to 55, wherein the actuator is a single coiled spring made of shape memory alloy.
- 20
57. The fastener of claim 56, wherein the actuator is adapted to elongate by energy provided from an energy source.
58. The fastener of claim 57, wherein there is a cable connection between the energy source and the actuator.

59. The fastener of claim 57, wherein the energy is in the form of infra red light or ultrasound.
60. The fastener of claim 57, wherein the energy source is a vehicle battery.
61. The fastener of any one of claims 41 to 60, wherein the locking pin is adapted to default to the locked position.
62. The fastener as claimed in any one of claims 41 to 61, which includes a second actuator.
63. The fastener of claim 62, wherein the second actuator comprises or includes shape memory alloy adapted to elongate upon application of appropriate energy to cause the locking pin to move to the locked position.
64. The fastener of any one of claims 41 to 63, which includes a detent adapted to hold the locking pin in the locked and/or release position.
65. The fastener of claim 64, wherein the detent is adapted to clip into a groove in the locking pin when the locking pin is in the release position, the engagement between the detent and the groove being adapted to prevent the locking pin moving towards the locked position without positive actuation.
66. The fastener of any one of claims 41 to 60, wherein the locking pin is adapted to move from the locked position to the release position irreversibly.
67. The fastener of any one of claims 41 to 60, wherein the actuator is adapted to cause the locking pin to move to the locked position when no longer elongated.
68. The fastener of any one of claims 41 to 67, which also includes means to communicate with at least one slave fastener.
69. The fastener of claim 68, wherein the communication means is adapted to communicate with the slave fastener when the locking pin has been caused to move to the release position.

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70. The fastener of any one of claims 41 to 69, wherein the fastener has an address.
71. The fastener of claim 70, wherein the address is encrypted.
72. The fastener of any one of claims 41 to 71, wherein the fastener includes means for enabling the fastener to recognise an authorised operator.
- 5 73. The fastener of any one of claims 41 to 72, wherein the locked pin is adapted to be moved to the release position manually.
74. A fastener substantially as herein described with reference to Figures 1 to 3 or 4 or 5 to 9 or 10 to 11 of the accompanying drawings.
75. A method of installing an airbag between a base and a cover, the method
10 including the steps of:
- (a) connecting at least one fastener as claimed in any one of claims 41 to 74 to the base;
 - (b) connecting the airbag to the base; and
 - (c) causing the locking pin to move to the locked position to secure the
15 airbag between the base and the cover.
76. The method of claim 75 in which steps (a) and (b) are reversed.
77. The method of claim 75 or 76, which includes the further step of connecting each fastener to wiring for the airbag.
78. The method of claim 77, wherein the airbag wiring is connected to an engine
20 control unit.